Searching for Life in Extreme Environments: Testing Instrumental Approaches in Terrestrial Settings.

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NASA's Solar System Exploration program has matured significantly in the 42 years since the first interplanetary spacecraft flew past Venus in 1962. With the exception of Pluto, the remainder of the planets and most of their major satellites have been examined with a variety of remote sensing observational techniques and a few have had insitu investigations (The Moon, Mars, Venus, Jupiter and Titan (very soon). The search for evidence of life (past or present) on these bodies is just beginning and each body represents an extreme environment compared to Earth-like conditions. The tool box is still in development. To be certain that we can answer the difficult questions when measurements are performed, we need to understand and demonstrate that our approaches work. Earth provides many natural sites to test our concepts. This talk will illustrate some of the places where we study extremophiles (deserts, deep ocean hydrothermal vents, beneath glaciers and ice sheets), and the methods we employ to gain knowledge about our terrestrial world that can be used elsewhere. We are advancing rapidly in our readiness to address the big question: 'Has life developed elsewhere in the Solar System and how can we detect and measure such a condition with good certainty?'